

1 New claims

2 1. Method for controlling the operation of an electronic
3 wheel unit (2) assigned to a vehicle wheel (1), comprising
4 the following steps:

5

6 Acquiring data in respect of the operating state of the
7 wheel (1) by means of at least one state detection device
8 (3);

9

10 Acquiring data in respect of the energy instantaneously
11 available to the electronic wheel unit (2) from a generator
12 (5) and from an energy storage device (6) by means of at
13 least one energy detection device (4, 4');

14

15 Controlling the operation the electronic wheel unit (2) and
16 the thereby determined energy consumption of the electronic
17 wheel unit (2) as a function of the data acquired by the at
18 least one state detection device (3) and the at least one
19 energy detection device (4, 4') by means of a central
20 control unit (9) connected to the at least one state
21 detection device (3) and to the at least one energy
22 detection device (4, 4'); and

23

24 Ensuring a functionality of the electronic wheel unit (2)
25 during predetermined important operating states of the wheel
26 (1) that at least temporarily consumes more energy than is
27 instantaneously available from the generator (5), and a
28 functionality of the electronic wheel unit (2) during
29 predetermined less important operating states of the wheel
30 (1) that is reduced below the degree available from the
31 available energy of the generator (5), in order that the
32 generator (5) charges up the energy storage device (6) to

1 compensate for energy previously over-consumed or to be
2 over-consumed.

3
4 2. Method according to claim 1,
5 characterized in that the electronic wheel unit (2) is
6 directly connected to the energy storage device (6) for
7 supplying it with energy.

8
9 3. Method according to claim 1 or 2,
10 characterized in that the energy storage device (6) is
11 disposed between the generator (5) and the electronic wheel
12 unit (2).

13
14 4. Method according to at least one of the preceding
15 claims,
16 characterized in that the energy storage device (6) is
17 implemented using charging electronics (7) for suitable
18 conversion and conditioning of the signals received from the
19 generator (5).

20
21 5. Method according to at least one of the preceding
22 claims,
23 characterized in that the energy storage device (6) is
24 implemented as a rechargeable battery, capacitor, gold cap
25 capacitor, a foil battery incorporated in a circuit board,
26 or the like.

27
28 6. Method according to at least one of the preceding
29 claims,
30 characterized in that there are provided a plurality of
31 state detection devices (3) for acquiring data in respect of
32 accelerations, vibrations, noise, forces, movements,
33 temperatures, pressures, etc. of the associated wheel (1).

1
2 7. Method according to at least one of the preceding
3 claims,
4 characterized in that there are provided a plurality of
5 energy detection devices (4, 4') for detecting the
6 instantaneously available energy of the generator (5) and
7 the instantaneous utilization state of the energy storage
8 device (6).

9
10 8. Method according to at least one of the preceding
11 claims,
12 characterized in that the central control unit (9) receives
13 and evaluates data in respect of the following operating
14 states from the at least one state detection device (3)
15 and/or the at least one energy detection device (4, 4'):
16 start of driving, e.g. a defined time interval after moving
17 off; initialization, whereby an initialization procedure is
18 executed e.g. on the vehicle receiver; localization, whereby
19 a localization procedure is executed e.g. on the vehicle
20 receiver; a risk state, e.g. for a below-threshold pressure
21 and/or an above-threshold speed of a wheel (1); a danger
22 state, e.g. for greatly below-threshold pressure of the
23 wheel (1); charging state of the energy system, e.g. for
24 high available energy at the output of the generator (5)
25 and/or a low fill level of the energy storage device; or the
26 like.

27
28 9. Method according to at least one of the preceding
29 claims,
30 characterized in that the central control unit (9) controls
31 the following responses of the electronic wheel unit (2) as
32 a function of the acquired data: the transmitting frequency
33 of the electronic wheel unit (2); the measurement frequency

1 of the electronic wheel unit (2); the repetition frequency
2 of a radio telegram to improve transmission reliability; the
3 accuracy of the measurements of the electronic wheel unit
4 (2); selecting which measurements are to be performed by the
5 electronic wheel unit (2); transition to or from a power
6 saving mode of the electronic wheel unit (2); connection of
7 the electronic wheel unit (2) to the energy storage device
8 (6); adaptation or selection of the transmitted data, e.g.
9 the telegram is reduced to the most necessary core data for
10 energy saving (only identifiers and possibly additional
11 pressure and temperature data), whereas without the need to
12 save energy all the sensor data together with calibration
13 and manufacturing data is transmitted; or the like.

14
15 10. Method according to at least one of the preceding
16 claims,
17 characterized in that the central control unit (9) is
18 connected to the electronic wheel unit (2) via a radio link.

19
20 11. Method according to at least one of the preceding
21 claims,
22 characterized in that the plurality of state detection
23 devices (3) and/or the plurality of energy detection devices
24 (4, 4') are implemented as passively operated sensors.

25
26 12. Method according to at least one of the preceding
27 claims,
28 characterized in that the generator (5) is implemented as an
29 energy transducer.

30
31 13. Apparatus for controlling the operation of an
32 electronic wheel unit (2) assigned to a vehicle wheel (1)
33 with:

1
2 at least one state detection device (3) for acquiring data
3 in respect of the operating state of the wheel (1);

4
5 at least one energy detection device (4, 4') for acquiring
6 data in respect of the energy instantaneously available to
7 the electronic wheel unit (2) from a generator (5) and from
8 an energy storage device (6); and with

9
10 a central control unit connected to the at least one state
11 detection device (3) and to the at least one energy
12 detection device (4, 4') for controlling the operation of
13 the electronic wheel unit (2) and the thereby determined
14 energy consumption of the electronic wheel unit (2) as a
15 function of the data acquired by the at least one state
16 detection device (3) and the at least one energy detection
17 device (4, 4');

18
19 wherein during predetermined important operating states of
20 the wheel (1) the central control unit (9) ensures a
21 functionality of the electronic wheel unit (2) which at
22 least temporarily consumes more energy than is
23 instantaneously available from the generator (5) and, during
24 predetermined less important operating states of the wheel
25 (1), reduces the functionality to below the degree available
26 from the available energy of the generator (5) in order that
27 the generator (5) charges up the energy storage device (6)
28 to compensate for the energy previously over-consumed or to
29 be over-consumed.

30
31 14. Apparatus according to claim 13,

1 characterized in that the electronic wheel unit (2) is
2 connected directly to the energy storage device (6) for
3 supplying energy.

4
5 15. Apparatus according to claim 13 or 14,
6 characterized in that the energy storage device (6) is
7 disposed between the generator (5) and the electronic wheel
8 unit (2).

9
10 16. Apparatus according to at least one of claims 13 to 15,
11 characterized in that the energy storage device (6) is
12 implemented with charging electronics (7) for appropriate
13 conversion and conditioning and the signals received by the
14 generator (5).

15
16 17. Apparatus according to at least one of claims 13 to 16,
17 characterized in that the energy storage device (6) is
18 implemented as a rechargeable battery, capacitor, gold cap
19 capacitor, a foil battery incorporated in a circuit board,
20 or the like.

21
22 18. Apparatus according to at least one of claims 13 to 17,
23 characterized in there are provided a plurality of state
24 detection devices (3) for acquiring data in respect of
25 accelerations, vibrations, noise, forces, movements,
26 temperatures, pressures, etc. of the associated wheel (1).

27
28 19. Apparatus according to at least one of claims 13 to 18,
29 characterized in that there are provided a plurality of
30 energy detection devices (4, 4') for detecting the
31 instantaneously available energy of the generator (5) and
32 the instantaneous utilization state of the energy storage
33 device (6).

1
2 20. Apparatus according to at least one of claims 13 to 19,
3 characterized in that the central control unit (9) receives
4 and evaluates data in respect of the following operating
5 states from the at least one state detection device (3)
6 and/or the at least one energy detection device (4, 4'):
7 start of driving, e.g. a defined time interval after moving
8 off; initialization, whereby an initialization procedure is
9 executed e.g. on the vehicle receiver; localization, whereby
10 a localization procedure is executed e.g. on the vehicle
11 receiver; a risk state, e.g. for a below-threshold pressure
12 and/or an above-threshold speed of a wheel (1); a danger
13 state, e.g. for greatly below-threshold pressure of the
14 wheel (1); charging state of the energy system, e.g. for
15 high available energy at the output of the generator (5)
16 and/or a low fill level of the energy storage device; or the
17 like.

18
19 21. Apparatus according to at least one of claims 13 to 20,
20 characterized in that the central control unit (9) controls
21 the following responses of the electronic wheel unit (2) as
22 a function of the acquired data: the transmitting frequency
23 of the electronic wheel unit (2); the measurement frequency
24 of the electronic wheel unit (2); the repetition frequency
25 of a radio telegram to improve transmission reliability; the
26 accuracy of the measurements of the electronic wheel unit
27 (2); selecting which measurements are to be performed by the
28 electronic wheel unit (2); transition to or from a power
29 saving mode of the electronic wheel unit (2); connection of
30 the electronic wheel unit (2) to the energy storage device
31 (6); adaptation or selection of the transmitted data, e.g.
32 the telegram is reduced to the most necessary core data for
33 energy saving (only identifiers and possibly additional

1 pressure and temperature data), whereas without the need to
2 save energy all the sensor data together with calibration
3 and manufacturing data is transmitted; or the like.

4

5 22. Apparatus according to at least one of claims 13 to 21,
6 characterized in that the central control unit (9) is
7 connected to the electronic wheel unit (2) via a radio link.

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9 23. Apparatus according to at least one of claims 13 to 22,
10 characterized in that the plurality of state detection
11 devices (3) and/or the plurality of energy detection devices
12 (4, 4') are implemented as passively operated sensors.

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14 24. Apparatus according to at least one of claims 13 to 24,
15 characterized in that the generator (5) is implemented as an
16 energy transducer.

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